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$$\therefore \Delta = \frac{ab}{a-b}\left[a\,\cos^{-1}\!\left(\frac{\sqrt{(4a^2-c^2)}}{2a}\right) - b\,\cos^{-1}\!\left(\frac{\sqrt{(4b^2-c^2)}}{2b}\right)\right.$$

$$\left. + \frac{c}{4}\left(\frac{\sqrt{(4a^2-c^2)}}{a} - \frac{\sqrt{(4b^2-c^2)}}{b}\right)\right].$$

Corollary. If $a=b$, $\Delta = a^2\left[\cos^{-1}\!\left(\frac{\sqrt{(4a^2-c^2)}}{2a}\right) - \frac{c\sqrt{(4a^2-c^2)}}{4a^2}\right]$.

PROBLEMS FOR SOLUTION.

ALGEBRA.

275. Proposed by PROF. R. D. CARMICHAEL, Anniston, Ala.

Given the simultaneous equations $x^y - y^x = 0$ and $y - x = a(a+1)^{1/a}$; find a solution which is real when $a > -1$.

276. Proposed by W. J. GREENSTREET, M. A.. Editor of The Mathematical Gazette, Stroud, England.

If x_1, x_2, ..., x_n be unequal and $f(n)$ be a rational integral function of degree $\not> n-2$, then shall

$$\sum_{r=n-1}^{r=1} \frac{f(x_r)}{(x_r-x_1)(x_r-x_2)\ldots(x_r-x_n)} = 0.$$

277. Proposed by G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va.

If a, β, γ, δ are the roots of the quartic $ax^4 + bx^3 + cx^2 + dx + e = 0$, calculate the value of the product of the twelve expressions of the form $(4a - 2\beta - \gamma - \delta)$ in terms of H, I, J, the well known functions of the differences of the roots.

GEOMETRY.

306. Proposed by J. SCHEFFER, A. M., Kee Mar College, Hagerstown, Md.

Find the length of the perpendicular let fall from the point in space $(5, 6, 7)$ upon the line $x = 2z - 3$, and $y = -3z + 1$.

307. Proposed by WALTER D. LAMBERT, 416 B Street N. E., Washington, D. C.

A family of planes containing a common line intersects a sphere. Find the orthogonal trajectories of the traces. An analytic solution is preferred.

308. Proposed by W. J. GREENSTREET, M. A., Editor of the Mathematical Gazette, Stroud, England.

Find the locus of O, if the differences of the squares of tangents from it to circles A, B, C are x^2, y^2, z^2, respectively.